

communications channel 106, is the sum of the output of communications channel 106  $x(t)$  and an additive noise signal  $w(t)$ . The received data  $y(t)$  202 is processed by a differential amplifier 204, one or more receive filters 206 and an analog-to-digital converter 208 to produce a sampled signal  $y(n)$ , where  $n$  is the sample number.

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### CLAIMS IN "CLEAN FORM"

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- 1    2.    (NEW) A method for processing data received from a communications channel
  - 2               comprising the computer-implemented steps of:
  - 3               receiving, from the communications channel, received data that is based upon both
  - 4               modulated data and distortion introduced by the communications channel,
  - 5               wherein the modulated data is the result of original data modulated onto one
  - 6               or more carriers;
  - 7               equalizing the received data using an equalizer to generate equalized data, wherein
  - 8               the equalizer uses an algorithm with a set of one or more coefficients selected
  - 9               to account for a frequency domain response of the equalizer; and
  - 10          recovering an estimate of the original data by demodulating the equalized data.
  - 1    3.    (NEW) The method as recited in Claim 2, wherein the set of one or more coefficients
  - 2               is selected to reduce variations in the frequency domain response of the equalizer.
  - 1    4.    (NEW) The method as recited in Claim 2, wherein the set of one or more coefficients
  - 2               is further selected to reduce the distortion introduced by the communications channel.
  - 1    5.    (NEW) The method as recited in Claim 2, wherein the received data was modulated
  - 2               using a cyclic prefix and the set of one or more coefficients is selected to ensure that a

3       combined impulse response of the communications channel and the equalizer is less  
4       than the cyclic prefix.

1     6.   (NEW) The method as recited in Claim 2, wherein finite precision arithmetic is  
2       employed in the equalizer to implement the algorithm and the set of one or more  
3       coefficients is selected to compensate for round off errors attributable to the use of the  
4       finite precision arithmetic in the equalizer.

1     7.   (NEW) The method as recited in Claim 6, wherein the set of one or more coefficients  
2       is determined based upon modeling noise attributable to the round off errors as a  
3       white noise source at an output of the equalizer.

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1     8.   (NEW) The method as recited in Claim 2, wherein the step of demodulating the  
2       equalized data includes the use of finite precision arithmetic and the set of one or  
3       more coefficients is selected to compensate for round off errors attributable to the use  
4       of the finite precision arithmetic to demodulate the equalized data.

1     9.   (NEW) The method as recited in Claim 8, wherein the step of demodulating the  
2       equalized data includes the use of a fast fourier transfer algorithm and the set of one  
3       or more coefficients is selected to compensate for round off errors attributable to the  
4       use of the finite precision arithmetic to implement the fast fourier transfer algorithm.

1     10.   (NEW) The method as recited in Claim 2, wherein the step of equalizing the received  
2       data includes processing the received data using a finite impulse response (FIR) filter.

1     11.   (NEW) The method as recited in Claim 10, wherein the received data is modulated  
2       using discrete multitone modulation and a set of one or more (FIR) coefficients for  
3       the finite impulse response filter is selected to maximize, in the equalizer, the  
4       numbers of bits used to represent each discrete multitone symbol.

1       12. (NEW) The method as recited in Claim 2, wherein the method further comprises  
2           processing the received data using an analog-to-digital converter and the set of one or  
3           more coefficients is further selected to account for quantization noise in the analog-  
4           to-digital converter.

1       13. (NEW) The method as recited in Claim 2, wherein the communications channel is a  
2           twisted pair telephone line.

1       14. (NEW) A computer-readable medium carrying one or more sequences of one or more  
2           instructions for processing data received from a communications channel, wherein the  
3           processing of the one or more sequences of one or more instructions by one or more  
4           processors cause the one or more processors to perform the steps of:  
5           receiving, from the communications channel, received data that is based upon both  
6           modulated data and distortion introduced by the communications channel,  
7           wherein the modulated data is the result of original data modulated onto one  
8           or more carriers;  
9           equalizing the received data using an equalizer to generate equalized data, wherein  
10           the equalizer uses an algorithm with a set of one or more coefficients selected  
11           to account for a frequency domain response of the equalizer; and  
12           recovering an estimate of the original data by demodulating the equalized data.

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1       15. (NEW) The computer-readable medium as recited in Claim 14, wherein the set of one  
2           or more coefficients is selected to reduce variations in the frequency domain response  
3           of the equalizer.

1       16. (NEW) The computer-readable medium as recited in Claim 14, wherein the set of one  
2                  or more coefficients is further selected to reduce the distortion introduced by the  
3                  communications channel.

1       17. (NEW) The computer-readable medium as recited in Claim 14, wherein the received  
2                  data was modulated using a cyclic prefix and the set of one or more coefficients is  
3                  selected to ensure that a combined impulse response of the communications channel  
4                  and the equalizer is less than the cyclic prefix.

1       18. (NEW) The computer-readable medium as recited in Claim 14, wherein finite  
2                  precision arithmetic is employed in the equalizer to implement the algorithm and the  
3                  set of one or more coefficients is selected to compensate for round off errors  
4                  attributable to the use of the finite precision arithmetic in the equalizer.

1       19. (NEW) The computer-readable medium as recited in Claim 18, wherein the set of one  
2                  or more coefficients is determined based upon modeling noise attributable to the  
3                  round off errors as a white noise source at an output of the equalizer.

1       20. (NEW) The computer-readable medium as recited in Claim 14, wherein the step of  
2                  demodulating the equalized data includes the use of finite precision arithmetic and the  
3                  set of one or more coefficients is selected to compensate for round off errors  
4                  attributable to the use of the finite precision arithmetic to demodulate the equalized  
5                  data.

1       21. (NEW) The computer-readable medium as recited in Claim 20, wherein the step of  
2                  demodulating the equalized data includes the use of a fast fourier transfer algorithm  
3                  and the set of one or more coefficients is selected to compensate for round off errors

4 attributable to the use of the finite precision arithmetic to implement the fast fourier  
5 transfer algorithm.

1 22. (NEW) The computer-readable medium as recited in Claim 14, wherein the step of  
2 equalizing the received data includes processing the received data using a finite  
3 impulse response (FIR) filter.

1 23. (NEW) The computer-readable medium as recited in Claim 22, wherein the received  
2 data is modulated using discrete multitone modulation and a set of one or more (FIR)  
3 coefficients for the finite impulse response filter is selected to maximize, in the  
4 equalizer, the numbers of bits used to represent each discrete multitone symbol.

1 24. (NEW) The computer-readable medium as recited in Claim 14, wherein the  
2 computer-readable medium includes one or more additional instructions which, when  
3 executed by the one or more processors, cause the one or more processors to process  
4 the received data using an analog-to-digital converter and the set of one or more  
5 coefficients is further selected to account for quantization noise in the analog-to-  
6 digital converter.

1 25. (NEW) The computer-readable medium as recited in Claim 14, wherein the  
2 communications channel is a twisted pair telephone line.

1 26. (NEW) An apparatus for processing data received from a communications channel  
2 comprising:  
3 an equalizer configured to equalize received data from the communications channel  
4 and generate equalized data, wherein the received data is based upon both  
5 modulated data and distortion introduced by the communications channel, and  
6 the modulated data is the result of original data modulated onto one or more

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7                   carriers, and wherein the equalizer is configured to use an algorithm with a set  
8                   of one or more coefficients selected to account for a frequency domain  
9                   response of the equalizer; and  
10                 a demodulator configured to generate an estimate of the original data by  
11                 demodulating the equalized data.

1   27. (NEW) The apparatus as recited in Claim 26, wherein the set of one or more  
2   coefficients is selected to reduce variations in the frequency domain response of the  
3   equalizer.

1   28. (NEW) The apparatus as recited in Claim 26, wherein the set of one or more  
2   coefficients is further selected to reduce the distortion introduced by the  
3   communications channel.

1   29. (NEW) The apparatus as recited in Claim 26, wherein the received data was  
2   modulated using a cyclic prefix and the set of one or more coefficients is selected to  
3   ensure that a combined impulse response of the communications channel and the  
4   equalizer is less than the cyclic prefix.

1   30. (NEW) The apparatus as recited in Claim 26, wherein finite precision arithmetic is  
2   employed in the equalizer to implement the algorithm and the set of one or more  
3   coefficients is selected to compensate for round off errors attributable to the use of the  
4   finite precision arithmetic in the equalizer.

1   31. (NEW) The apparatus as recited in Claim 30, wherein the set of one or more  
2   coefficients is determined based upon modeling noise attributable to the round off  
3   errors as a white noise source at an output of the equalizer.

1    32. (NEW) The apparatus as recited in Claim 26, wherein the demodulator is configured  
2        to process the equalized data using finite precision arithmetic and the set of one or  
3        more coefficients is selected to compensate for round off errors attributable to the use  
4        of the finite precision arithmetic to demodulate the equalized data.

1    33. (NEW) The apparatus as recited in Claim 32, wherein the demodulator is configured  
2        to process the equalized data using a fast Fourier transfer algorithm and the set of one  
3        or more coefficients is selected to compensate for round off errors attributable to the  
4        use of the finite precision arithmetic to implement the fast Fourier transfer algorithm.

1    34. (NEW) The apparatus as recited in Claim 26, further comprising a finite impulse  
2        response (FIR) filter configured to process the receive data.

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1    35. (NEW) The apparatus as recited in Claim 34, wherein the received data is modulated  
2        using discrete multitone modulation and a set of one or more (FIR) coefficients for  
3        the FIR filter is selected to maximize the number of bits used to represent each  
4        discrete multitone symbol in the equalizer.

1    36. (NEW) The apparatus as recited in Claim 26, further comprising an analog-to-digital  
2        converter configured to process the received data and the set of one or more  
3        coefficients is further selected to account for quantization noise in the analog-to-  
4        digital converter.

1    37. (NEW) The apparatus as recited in Claim 26, further comprising a coefficient  
2        generator for generating the set of one or more coefficients.

1    38. (NEW) The apparatus as recited in Claim 26, wherein the communications channel is  
2        one or more twisted pair telephone lines.

1    39. (NEW) A computer-readable medium carrying coefficient data that represents a set of  
2    one or more coefficients that are selected to account for a frequency domain response  
3    of an equalizer when the coefficients are used with an algorithm to equalize received  
4    data from a communications channel, wherein the received data is based upon both  
5    modulated data and distortion introduced by the communications channel and the  
6    modulated data is the result of original data modulated onto one or more carriers.

1    40. (NEW) A method for generating coefficient data comprising the computer-  
2    implemented step of generating coefficient data that represents a set of one or more  
3    coefficients that are selected to account for a frequency domain response of an  
4    equalizer when the coefficients are used with an algorithm to equalize received data  
5    from a communications channel, wherein the received data is based upon both  
6    modulated data and distortion introduced by the communications channel and the  
7    modulated data is the result of original data modulated onto one or more carriers.

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1    41. (NEW) An apparatus for generating coefficient data comprising:  
2    a storage medium for storing the coefficient data; and  
3    a coefficient generator configured to generate the coefficient data, wherein the  
4    coefficient data represents a set of one or more coefficients that are selected to  
5    account for a frequency domain response of an equalizer when the coefficients  
6    are used with an algorithm to equalize received data from a communications  
7    channel, wherein the received data is based upon both modulated data and  
8    distortion introduced by the communications channel and the modulated data  
9    is the result of original data modulated onto one or more carriers.